UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

ENTROPIC COMMUNICATIONS, LLC,

Plaintiff,

v.

COX COMMUNICATIONS, INC., *et al.*,

Defendants.

ENTROPIC COMMUNICATIONS, LLC,

Plaintiff,

v.

COMCAST CORPORATION, *et al.*,

Defendants.

Case No. 2:23-cv-01049-JWH-KES (Lead Case)

Case No. 2:23-cv-01050-JWH-KES (Related Case)

[Assigned to the Honorable John W. Holcomb]

REBUTTAL DECLARATION OF JOHN HOLOBINKO IN SUPPORT OF PLAINTIFF ENTROPIC'S PROPOSED CLAIM CONSTRUCTIONS

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I, John Holobinko, declare as follows:

I. Introduction

1. I am over the age of 18 and am competent to make this Rebuttal Declaration ("Rebuttal Declaration" or "this Declaration"). I have personal knowledge, or have developed knowledge, of the relevant technologies and the matters set forth herein based upon my education, training, or experience. If called upon to do so, I would testify competently thereto.

2. I previously submitted a declaration ("Original Declaration") in support of Plaintiff Entropic Communications, LLC's ("Entropic") proposed claim constructions in the above-captioned matter. Specifically, I offered opinions regarding how a person of ordinary skill in the art would understand certain claim terms in U.S. Patent No. 10,135,682 ("'682 Patent"), a copy of which was attached to my Original Declaration as Exhibit B.

3. As I noted in ¶ 47 of my Original Declaration, Defendants' invalidity contentions did not provide any clarity as to the specific reasons why Defendants contend the term "SNR-related metric" is indefinite. Now that Defendants have offered the Declaration of Dr. Sandeep Chatterjee and made their invalidity theories known, I submit this Rebuttal Declaration to address specific errors in Dr. Chatterjee's opinions related to the alleged indefiniteness of "SNR-related metric."

II. Qualifications

4. My qualifications are set forth in my initial declaration at ¶¶ 7–16 and in Exhibit A attached thereto.

III. Materials Considered

5. In addition to the "Materials Considered" that I listed in Section IV of my Original Declaration, I have further considered the materials listed below:

a. The Declaration of Dr. Sandeep Chatterjee Regarding Claim Construction ("Chatterjee Decl.") and attached exhibits;

b. Arnold, H.D. & Espenschied, L. (1923), TRANSATLANTIC RADIO TELEPHONY, *Bell System Technical Journal* Vol. 2, 116–144;

c. Collins, L. (1969), *Signal-to-Noise Ratios for Television Transmission*, MIT Lincoln Laboratory; and

d. Shannon (1949), COMMUNICATION IN THE PRESENCE OF NOISE, *Proceedings of the I.R.E.* Vol. 37(1), 10–21.

IV. Additional Opinions Regarding the Term "SNR-Related Metric"

6. Dr. Chatterjee acknowledges that signal-to-noise ratio ("SNR") was a well-known term in the art. *See* Chatterjee Decl. ¶ 79. However, he mistakenly opines that a POSITA would not have been familiar with "SNR-related metric(s)." *See id.* at ¶ 80. Dr. Chatterjee appears to misunderstand or misstate basic concepts underlying the '682 Patent, concepts that are (and were at the time of the '682 Patent's priority date) well-understood to a POSITA. Given these misstatements in Dr. Chatterjee's Declaration, I feel compelled to discuss these basic concepts and point out where Dr. Chatterjee draws incorrect conclusions from them.

A. Overview of noise and SNR

7. It has long been known that network communications are affected by noise, which refers to "unwanted disturbances superposed upon a useful signal that tend to obscure its information content." *See* Chatterjee Decl. Ex. M at 483–484. This noise is an unavoidable consequence of physics inherent to the physical device (*e.g.*, circuitry, cabling, *etc.*) that is used to transmit the signal. *See* Chatterjee Decl. Ex. CC at 373 (defining noise as "any signal or interference on a circuit other than the signal being transmitted" and noting there is "inherent circuit noise").

8. The effect of noise in the context of digitally modulated signals is a bedrock of information theory. *See* Ex. I (Shannon (1949), COMMUNICATION IN THE PRESENCE OF NOISE, *Proceedings of the I.R.E.* Vol. 37(1), 10–21). Noise causes distortion of the desired signal such that some of the encoded bits may be rendered indecipherable. Thus, noise has a negative impact on the information carrying

capacity of a signaling channel, as Shannon recognized. *See id.* at 11. All else being equal, less information can be carried though to its destination. *See generally* Chatterjee Decl. Ex. CC at 372–373 (describing how noise "degrade[s] the quality of signals"). In summary, the signal quality and thus its corresponding information carrying capacity are negatively affected by noise.

9. SNR is a ratio of the signal to be transmitted against the level of noise, and it has been known since the early 1900s[1] as a common way to measure the overall information carrying capacity of a channel (and therefore, channel quality), based on the noise levels affecting the channel. *See* Holobinko Original Decl. ¶ 48. This is confirmed by Newton's Telecom Dictionary, which Dr. Chatterjee cites. *See* Chatterjee Decl. Ex. S at 1043. It defines SNR as "[a] measurement of the relative level of noise on a circuit[2] and, therefore, the quality of the transmission" and specifically notes that "SNR is the ratio of the usable signal being transmitted to the noise or undesired signal." *Id.*; *see also* Chatterjee Decl. Ex. CC at 373 ("[i]n the event of a weak signal, however, a lower signal-to-noise ratio reduces the quality of the received signal"). For a given signal transmission, the SNR therefore indicates the quality of the signal compared to the inevitably present noise.

10. As already discussed, the signal quality in the face of noise indicates how much information a digital signal can carry. This aspect of SNR is most interesting to the '682 Patent and the invention therein, which is why the patent

[1] Signal to noise ratio has been used since as early as 1923. *See* Ex. J (Arnold, H.D. & Espenschied, L. (1923), TRANSATLANTIC RADIO TELEPHONY, *Bell System Technical Journal* Vol. 2, 116–144) at 133 ("The interference at the receiving station likewise may be measured and the ratio of the strength of the signal waves to the interfering waves may be taken as a measure of freedom from interference; this in turn being directly related to the readiness with which the messages are understood"). By the 1960's and '70s, SNR was commonly used for measuring, *e.g.*, television signals. *See generally* Ex. K (Collins, L. (1969), *Signal-to-Noise Ratios for Television Transmission*, MIT Lincoln Laboratory).

[2] Newton's refers to signals and noise "on a circuit." However, a POSITA would apply substantially the same definition in the context of digitally modulated communications, where SNR measures communications on a channel.

describes SNR and related metrics as "performance metrics." *See* '682 Patent 3:54–59. The performance refers to the carrying capacity.

11. SNR is not the only measurement that indicates the signal quality and thus the performance of a signaling channel. Various SNR-*related* metrics are "related" to SNR in the sense that they measure the same fundamental communications property as SNR—the information carrying capacity (*i.e.*, "quality" or "performance") of a channel. This is the way a POSITA would understand the term "SNR-related metric."

12. With that background, I discuss further below how Dr. Chatterjee seems to have arrived at opinions about SNR and SNR-related metrics that I believe are incorrect.

B. Dr. Chatterjee's misinterpretation of "SNR-related"

13. The flaw in Dr. Chatterjee's analysis is that he interprets "SNR-related" to mean *anything that influences, or is influenced by, SNR*. *See* Chatterjee Decl. ¶ 86 ("A wide range of additional metrics may, in theory, impact SNR or be impacted by SNR"). This leads him to conclude that a POSITA would be uncertain as to whether certain metrics are SNR-related, for example because a given metric might correlate with SNR in some instances but not in others. *See id.* at ¶¶ 86–91.

14. I disagree. In my opinion, Dr. Chatterjee's reading of the term is detached from the real-world knowledge and experience of a POSITA. (I note in particular that Dr. Chatterjee qualifies his analysis with the phrase "*in theory*.") A POSITA would not interpret "SNR-related" the way Dr. Chatterjee does because the POSITA would not proceed "in theory," but instead grounded in engineering reality. That POSITA would have no trouble reasonably ascertaining whether a given metric is SNR-related, especially in view of the intrinsic record.

15. The '682 Patent provides some examples of "SNR-related metric[s]" as including metrics "such as SNR at a particular frequency or SNR over a range of frequencies (an SNR profile), noise levels, strength of desired signals, and/or the

like." '682 Patent 3:56–59. In addition, U.S. Patent Application No. 13/948,401, which is incorporated by reference in the '682 Patent, similarly states:

> A measured performance metric may be, for example, an SNR-related metric such as noise levels, strength of received desired signals, SNR at a particular frequency, SNR over a range of frequencies (an SNR profile), bit error rate, symbol error rate, and/or the like.

Chatterjee Decl. ¶ 84.

16. Dr. Chatterjee acknowledges these recitations of the Patent and the various examples, but opines that the inclusion of the phrase "and/or the like" creates ambiguity because it "provides no further guidance for determining whether a particular additional metric is SNR-related." *Id*. I disagree. If anything, the use of the phrase "and/or the like" would confirm to a POSITA that an SNR-related metric is a metric that is *like* one of the six listed (SNR at a particular frequency, SNR over a range of frequencies (also known as an SNR profile), noise levels, strength of desired signals, bit error rate, and symbol error rate).

17. In my opinion, a POSITA would have no difficulty understanding that the reference to "and/or the like" implicate metrics that are like SNR in that they too provide a measure of signal quality which in turn indicates the information carrying capacity of the signaling channel. Contrary to Dr. Chatterjee's conjectures "in theory," the reference to "and/or the like" does not divorce the term from its origins in SNR and communications theory, nor does it convert SNR-related into a much broader term encompassing any metric that may *affect* SNR.

18. I further disagree with Dr. Chatterjee's opinion that "a person of skill in the art would have no understanding of how to determine whether a given metric is an 'SNR-related metric.'" *See* Chatterjee Decl. ¶ 86. As I have already stated above at ¶¶ 11 and 14, the POSITA is guided in understanding the scope of the phrase by the technical reality. Both SNR and SNR-related metrics measure the same

fundamental communications property: the signal quality, which in turn informs about the information carrying capacity (*i.e.*, "quality" or "performance").

19. In support of his indefiniteness opinion, Dr. Chatterjee conjectures that various factors he lists might or might not be SNR-related metrics, and that a POSITA would have no way of determining whether they are within the scope of the claims (*e.g.*, latency, throughput, environmental factors, *etc.*). *See id.* at ¶¶ 87–91. However, Dr. Chatterjee's analysis merely addresses whether each factor might either *influence* SNR (such as environmental factors) or be influenced by SNR (latency, throughput). That analysis misses the point because the question is whether a metric is "related" to SNR in the sense that, like SNR, it provides a measure of signal quality itself. In my opinion, a POSITA would not be confused as to whether any of these factors is an "SNR-related metric" in the context of the '682 Patent. Below, I explain how a POSITA would be able to determine whether these examples, or any others, are SNR-related metrics.

i. Latency

20. As explained by Dr. Chatterjee, latency relates to the "waiting time or time delay" for network communications. Chatterjee Decl. ¶ 87. Latency characterizes the time delay of processing packets, *e.g.* over a bridge or router. *See e.g.* Chatterjee Decl. Ex. S at 674–675 (defining latency as a "length of time the packet is stuck in a bridge or router"). Ultimately the signal quality may *influence* the latency of information it carries—a poor signal may result in more delay because of errors, retransmission requests, etc. But this does not convert latency into a measure of signal quality.

21. Latency is not necessarily a metric for the information carrying capacity of the physical channel because latency could be, and typically is, affected by factors other than those that affect channel quality. Dr. Chatterjee acknowledges as much when he states that "[a] decrease in SNR could impact bit error rate, and depending on the degree of impact on bit error rate, and multiple other factors, an increased bit

error rate could also lead to an increase in latency." Chatterjee Decl. ¶ 88 (emphasis added). As an example, in a theoretically noiseless transmission network, there could still be significant latency solely attributable to the endpoint devices, such as from processing delays.

22. A POSITA would not view latency as an SNR-related metric because it is not a measure of signal quality. A POSITA would not use latency as a substitute for SNR, or more generally as a measure of noise in the channel. Therefore, it would be reasonably clear to a POSITA that latency is not an SNR-related metric.

ii. Throughput

23. Throughput broadly refers to an amount of information, per unit time, that can be transmitted through a communications network. *See* Chatterjee Decl. ¶ 89 (characterizing throughput as "the actual amount of useful and non-redundant information which is transmitted or processed, i.e., the end result of a data call"); *see also* Chatterjee Decl. Ex. S at 1157 ("Throughput is a function of bandwidth, error performance, congestion, and other factors"). As with latency, "throughput" is a metric that involves many factors above and beyond the signal quality. Throughput, as Dr. Chatterjee uses the term, measures performance of the *entire* network, not just the signal quality itself. *See e.g.* Chatterjee Decl. Ex. S at 1157 (describing throughput as "a measure of the efficiency of [a] communications network"). Throughput, like latency, may be heavily or even exclusively a function of processing efficiency or lack thereof. Throughput is not a useful indicator of the signal quality in a noisy environment. Dr. Chatterjee seems to agree, admitting that "throughput may sometimes be impacted by SNR and may sometimes not be." Chatterjee Decl. ¶ 89.

24. Dr. Chatterjee and I therefore appear to agree on the basic facts, but he draws what I consider to be the wrong conclusion. A POSITA would not find the unreliability of "throughput" for indicating signal quality as somehow rendering the term "SNR-related metric" confusing. To the contrary, the POSITA would recognize

that throughput is not an SNR-related metric where it is simply not a reasonable measure of signal quality.

25. In my opinion, the situation is easy for a POSITA to sort out. If throughput is measured purely in terms of the physical channel such that it provides a measure of signal quality, then that particular "throughput" could serve as an "SNR-related" metric. However, where throughput does not provide a measure of signal quality, it is not an SNR-related metric.

iii. Environmental factors

26. Dr. Chatterjee cites various environmental factors such as water buildup (*e.g.*, moisture or humidity), heat, and the physical distance between components as factors that "could impact SNR," although he notes that "numerous additional factors" would also contribute to the overall noise. *See* Chatterjee Decl. ¶ 90. I agree with Dr. Chatterjee that environmental factors such as these can have an influence on SNR because they can contribute to the overall noise in the channel. However, these environmental factors are generally not measures of signal quality.

27. As an initial matter, environmental factors such as these are generally not even measured by the network. Some cannot be measured at all. For example, there is no metric for measuring water in a cable installation. Further, there is not a consistent correlation between SNR and any of these factors. In other words, a POSITA cannot confidently say that 'X' amount of heat or moisture on the cable will have 'Y' impact on SNR. Thus, if a POSITA were to be told that the ambient temperature for the channel is X degrees, the POSITA would not have received a metric that actually measures the signal quality of the channel. Therefore, it would be reasonably clear to a POSITA that these factors are not "SNR-related metrics."

iv. Number of coupling elements

28. Dr. Chatterjee additionally cites to a portion of the '682 Patent, which he alleges "describes the 'number of coupling elements' between the CMTS and a cable modem as a 'performance metric.'" Chatterjee Decl. ¶ 91 (citing '682 Patent

6:46–61). However, Dr. Chatterjee misreads the patent's specification. What it actually states is that "[t]he number of coupling elements may be determined ***based on***, for example, measured performance metrics (e.g., SNR profile) of the CMs and/or address or GPS information associated with the CMs." '682 Patent 6:52–55. This is consistent with what a POSITA would understand: the number of coupling elements might have some impact on noise in the channel, but it would not be useful to use "number of coupling elements" as a measure of signal quality, overall noise, channel health, or the information carrying capacity of a channel. Therefore, it would be reasonably clear to a POSITA that the number of coupling elements is not an SNR-related metric.

29. Because a POSITA would have no trouble discerning whether a particular metric is "SNR-related," it is my opinion that the term "SNR-related metric" is not indefinite.

I declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

29 April 2024
Date

John Holobinko